

Serial No. 09/901,746 July 22, 2003 Reply to the Office Action dated February 25, 2003 Page 2 of 9

## **AMENDMENTS TO THE CLAIMS:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

## **LISTING OF CLAIMS:**

Claim 1 (currently amended): A resonator comprising:

a multi-layer substrate having an upper and lower surface, and including at least two conductor layers which include at least two grounding conductor layers and a plurality of dielectric layers, one of the at least two grounding conductor layers being disposed on the lower surface of the multi-layer substrate;

- a strip line disposed between the at least two grounding conductor layers;
- a microstrip line disposed on the upper surface of said multi-layer substrate; and
- a through hole formed in said dielectric layers to connect said strip line to said microstrip line; wherein

at least a portions of the one of the at least two conductor layers that is closest to said microstrip line and faces the microstrip line is are omitted; and

one of the omitted portions is aligned with the through hole and another of the omitted portions is aligned with the microstrip line

said microstrip line defines a microstrip line resonator;

at least one of said plurality of dielectric-layers, at least one of said at least two grounding conductor layers and said strip line define a strip line resonator; and

a single resonator is defined by said microstrip line resonator and said strip line resonator.

Claim 2 (currently amended): A resonator according to Claim 1, wherein said omitted portion of said one of the at least two conductor layers that is omitted is disposed within said multi-layer substrate and aligned with the microstrip line is



S rial No. 09/901,746 July 22, 2003 Reply to the Office Action dated February 25, 2003 Page 3 of 9

arranged such that said grounding conductor layer disposed on the lower surface of said multilayer substrate faces said microstrip line.

Claim 3 (currently amended): A resonator according to Claim 1, wherein said omitted portions of said one of the at least two conductor layers that is omitted defines <u>define an openings</u> in said one of the at least two conductor layers.

Claim 4 (currently amended): A resonator according to Claim 3, wherein said openings hashave one of a substantially rectangular shape and a substantially square shape.

Claim 5 (original): A resonator according to Claim 1, wherein said strip line has a substantially U-shaped configuration.

Claim 6 (original): A resonator according to Claim 1, wherein the resonator comprises only one said strip line.

Claim 7 (original): A resonator according to Claim 1, wherein the resonator comprises only one said microstrip line.

Claim 8 (currently amended): A resonator comprising:

a multi-layer substrate having an upper and lower surface, and including at least two conductor layers which include at least two grounding conductor layers and a plurality of dielectric layers, one of the at least two grounding conductor layers being disposed on the lower surface of the multi-layer substrate, and one of the at least two conductor layers that is closest to said microstrip line and faces the microstrip line has an openings formed therein;

a strip line disposed between the at least two grounding conductor layers;

resonator.

PAGE 05/15

Serial No. 09/901,746 July 22, 2003 Reply to the Office Action dated February 25, 2003 Page 4 of 9

a microstrip line disposed on the upper surface of said multi-layer substrate; and a through hole formed in said dielectric layers to connect said strip line to said microstrip line; wherein

one of the openings is aligned with the through hole and another of the openings is aligned with the microstrip linesaid microstrip line defines a microstrip line resonator; at least one of said plurality of dielectric layers, at least one of said at least two grounding conductor layers and said strip line define a strip line resonator; and a single resonator is defined by said microstrip line resonator and said strip line

Claim 9 (currently amended): A resonator according to Claim 8, wherein said opening aligned with the microstrip line is arranged such that said grounding conductor layer disposed on the lower surface of said multi-layer substrate faces said microstrip line.

Claim 10 (currently amended): A resonator according to Claim 8, wherein said openings has have one of a substantially rectangular shape and a substantially square shape.

Claim 11 (original): A resonator according to Claim 8, wherein said strip line has a substantially U-shaped configuration.

Claim 12 (original): A resonator according to Claim 8, wherein the resonator comprises only one said strip line.

Claim 13 (original): A resonator according to Claim 8, wherein the resonator comprises only one said microstrip line.

PAGE 05/15

S rial No. 09/901,746 July 22, 2003 Reply to the Office Action dated February 25, 2003 Page 5 of 9

Claim 14 (currently amended): A voltage controlled oscillator comprising: a resonator including:

a multi-layer substrate having an upper and lower surface, and including at least two conductor layers which include at least two grounding conductor layers and a plurality of dielectric layers, one of the at least two grounding conductor layers being disposed on the lower surface of the multi-layer substrate;

a strip line disposed between the at least two grounding conductor layers; a microstrip line disposed on the upper surface of said multi-layer substrate; and

a through hole formed in said dielectric layers to connect said strip line to said microstrip line;

wherein at least a-portions of the one of the at least two conductor layers that is closest to said microstrip line and faces the microstrip line is are omitted;

one of the omitted portions is aligned with the through hole and another of omitted portions is aligned with the microstrip linesaid microstrip line defines a microstrip line resonator;

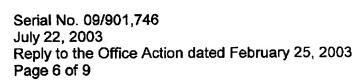
at least one of said plurality of dielectric layers, at least one of said at least two grounding conductor layers and said strip line define a strip line resonator; and a single resonator is defined by said microstrip line resonator and said strip line resonator, and

a plurality of electronic component elements disposed on the upper surface of the multi-layer substrate and arranged to define a circuit.

Claim 15 (original): The voltage controlled oscillator according to claim 14, wherein the plurality of the electronic component elements and the resonator are electrically connected to each other.

Claim 16 (currently amended): The voltage controlled oscillator according to

Chy B1



claim 14, wherein said <u>omitted</u> portion <u>aligned with the microstrip line of said one of the</u> at least two conductor layers that is omitted is disposed within said multi-layer substrate and is arranged such that said grounding conductor layer disposed on the lower surface of said multi-layer substrate faces said microstrip line.

Claim 17 (currently amended): The voltage controlled oscillator according to claim 14, wherein said <u>omitted portions</u> <u>of said one of the at least two conductor layers that is omitted defines define</u> <u>an openings</u> in said one of the at least two conductor layers.

Claim 18 (currently amended): The voltage controlled oscillator according to claim 17, wherein said openings has have one of a substantially rectangular shape and a substantially square shape.

Claim 19 (original): The voltage controlled oscillator according to claim 14, wherein said strip line has a substantially U-shaped configuration.

Claim 20 (original): The voltage controlled oscillator according to claim 14, wherein the voltage controlled oscillator comprises only one said strip line.

Claim 21 (original): The voltage controlled oscillator according to claim 14, wherein the voltage controlled oscillator comprises only one said microstrip line.